

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/594,031 Confirmation No. 4637
Applicant : Kenji SHIGA et al.
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For : Modifier for Polyester Resin and Process for Producing Molded
Article With the Same
Group Art Unit : 1796
Examiner : Robert Stockton JONES, JR.
Docket No. : 12477/13
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DECLARATION UNDER 37 C.F.R. 1.132

SIR:

I, Kenji Shiga, hereby declare as follows:

1. I received a Bachelor's degree in March 1997 from the College of Chemistry, Ritsumeikan University and a Master's degree in March 1999 from the Graduate School of Science and Engineering, Ritsumeikan University.

2. I joined the Research Center at Toyobo Co., Ltd. in April 1999. Since then, I have worked in the field of development and research of co-polyester, development and research of polyester resin modifiers, application for adhesives of co-polyesters, and designing molding materials for electronic devices.

3. I am currently employed at Toyobo Co. Ltd. as an assistant manager of the Fundamental Technology & Process Development Department in the Plastics Research and Development Center.

4. I am an inventor for the above-identified patent application; I have read the Office Action mailed July 28, 2010 and the references cited therein; and I am familiar with the subject matter thereof.

5. I have supervised or directed the conduct of the following experiment and hereby submit my report thereon.

Experiments

1. Composition of Samples

- a) Sample A and Example 1 were identical in composition, which composition is shown below:
Amorphous Polyester Resin A (27% by weight) as the first Amorphous Polyester Resin;
Reactive Compound I (3% by weight); and
Amorphous Polyester Resin B (70% by weight) as the second Amorphous Polyester Resin.
- b) Sample B and Example 14 were identical in composition, which composition is shown below:
Amorphous Polyester Resin B (27% by weight) as the first Amorphous Polyester Resin;
Reactive Compound J (3% by weight); and
Polyethylene terephthalate (PET) (70% by weight) as the Crystalline Polyester Resin.
- c) Sample C and Example 18 were identical in composition, which composition is shown below:
Amorphous Polyester Resin E (20% by weight) as the first Amorphous Polyester Resin;
Reactive Compound I (10% by weight); and
Polybutylene naphthalate (PBN) (70% by weight) as the Crystalline Polyester Resin.

The first Amorphous Polyester Resins A, B, and E and Reactive Compounds I and J were prepared as described in the present specification on page 18, line 26 to page 22, line 10.

2. Experimental Procedures

In Examples 1, 14, and 18, the first Amorphous Polyester Resin A, B, or E and Reactive Compound I or J were first melted and kneaded in order to react a portion of two or more glycidyl groups and/or isocyanate groups of the reactive compound with the amorphous

polyester resin to prepare a modifier for a polyester resin. Then, the modifier and the second Amorphous Polyester Resin B, PET, or PBN together were melt molded.

On the other hand, Samples A, B, and C were obtained by directly dry-blending the first Amorphous Polyester Resin A, B, or E, Reactive Compound I or J, and the second Amorphous Polyester Resin B, PET, or PBN to prepare a mixture thereof, without preparing a modifier for a polyester resin, and melt molding the mixture.

The conditions for melt molding in Samples A, B, and C corresponded to the conditions for melt molding in Examples 1, 14, and 18, respectively.

3. Evaluations

Evaluation methods for Samples A, B, and C corresponded to the evaluation methods for Examples 1, 14, and 18, as described in the specification on page 22, line 26 to page 26, line 12 and page 29, line 20 to page 34, line 6.

3. Results

< Table 1 >

Composition	Example 1	Sample A	Example 14	Sample B	Example 18	Sample C
Evaluation	Amorphous Polyester Resin (I)	A(27)	B(27)	B(27)	B(20)	E(20)
	Reactive Compound (II)	I(3)	I(3)	I(3)	I(10)	I(10)
	Amorphous Polyester Resin (III)	B(70)	-	-	-	-
	Crystalline Polyester Resin (IV)	-	PEI(70)	PEI(70)	PBN(70)	PBN(70)
Evaluation	Tendency of increase and decrease in reduced viscosity	ⓐ	ⓑ	ⓒ	ⓓ	ⓔ
	Impact resistance test	○	○	○	○	○
	Transparency	○	○	○	○	○
	Situation of sizing die processing (continuous productivity)	○	○	○	○	○
	Product dimension precision	○	○	○	△	○
	Surface smoothness	○	○	○	○	○
	Presence or absence of product warpage	Absence	Presence	Presence	Absence	Presence
	Parison retaining state	○	○	○	○	○
	Product precision	○	○	○	○	○
	Transparency	○	○	○	○	○
	Sheet peelability	○	○	○	○	○
	Sheet pulling property	ⓐ	ⓑ	ⓒ	ⓓ	ⓔ
	Transparency	○	○	○	○	○

4. Conclusion

As shown in Table 1, gelation did not occur and good molding properties were achieved in Examples 1, 14, and 18. On the other hand, gelation and inferior molding properties were observed in Samples A, B, and C. Therefore, the experiments showed that unexpected results, including inhibition of gelation, were achieved by first reacting the first Amorphous Polyester Resin with the Reactive Compound in order to react a portion of two or more glycidyl groups and/or isocyanate groups of the Reactive Compound with the first Amorphous Polyester Resin to prepare a modifier for a polyester resin and then melt molding the modifier and the second Amorphous Polyester Resin or the Crystalline Polyester Resin, compared with directly dry-blending the first Amorphous Polyester Resin, the Reactive Compound, and the second Amorphous Polyester Resin or the Crystalline Polyester Resin to prepare a mixture thereof, without preparing a modifier for a polyester resin, and melt molding the mixture.

Applicants note that although "double circle" is shown in Table 1 for the tendency of increase and decrease in reduced viscosity (with "injection molding") of Samples A, B, and C, extremely increased viscosity, instead of a suitable tendency of increased viscosity, was observed for Samples A, B, and C.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the patent or any reexamination certificate issued therefor.

Dated: Oct. 21, 2010

Kenji Shiga
Kenji Shiga